

**5-alt REPORT FOR UNNAMED TRIBUTARY TO SHELTON CREEK
IN THE SEQUATCHIE RIVER WATERSHED (06020004)**

AN ALTERNATIVE RESTORATION APPROACH UNDER THE LONG-TERM VISION FOR TMDLs

Tennessee Department of Environment and Conservation
Division of Water Resources



December 14, 2018

Background.

EPA’s current [Vision](#) for the Clean Water Act (CWA) 303 program provides an updated and collaborative framework for more efficient implementation of the program through the states. In particular, it encourages focusing attention on state-identified priority waters and acknowledges states have flexibility in using available tools beyond Total Maximum Daily Loads (TMDLs) to attain water quality restoration and protection. In the [informational materials](#) EPA provided to assist states prepare and review the 2016 Integrated report (IR), EPA acknowledged the most effective method for achieving water quality standards for some water quality impaired segments may be through controls developed and implemented in advance of a TMDL. Alternative approaches designated in the Integrated Report as sub-category 5-alt—in advance of a TMDL—recognize that, in some cases, an alternative restoration approach may be more effective than TMDL reports in reaching the goal of re-attaining support status for impaired waters. If an alternative restoration approach does not show progress in attaining water quality standards, the impaired segment will be reprioritized for TMDL development.

In 2015, Tennessee developed a [priority framework document](#) outlining plans to implement prioritization of alternative restoration projects. In it, Tennessee has identified HUC-12s with both nutrient-impaired streams and source water protection areas. In keeping with Tennessee’s [watershed approach](#) and corresponding schedule, Tennessee considered Group 5 watersheds for alternative plans in FY-2018 and FY-2019. This report addresses Unnamed Tributary to Shelton Creek in Subwatershed 060200040304 in the Sequatchie River Watershed (06020004).

HUC-8	HUC-12	IMPAIRED STREAM	STREAM ID
06020004 Sequatchie River	060200040304 Sequatchie River- Hicks Creek	UT to Shelton Creek	TN06020004001_0910

Table 1. Numbers and Names of HUCs and Nutrient-Impaired Streams in the Report. HUC, Hydrologic Unit Code; UT, Unnamed Tributary.

I. Nutrient-Impaired Waterbodies to be Addressed.

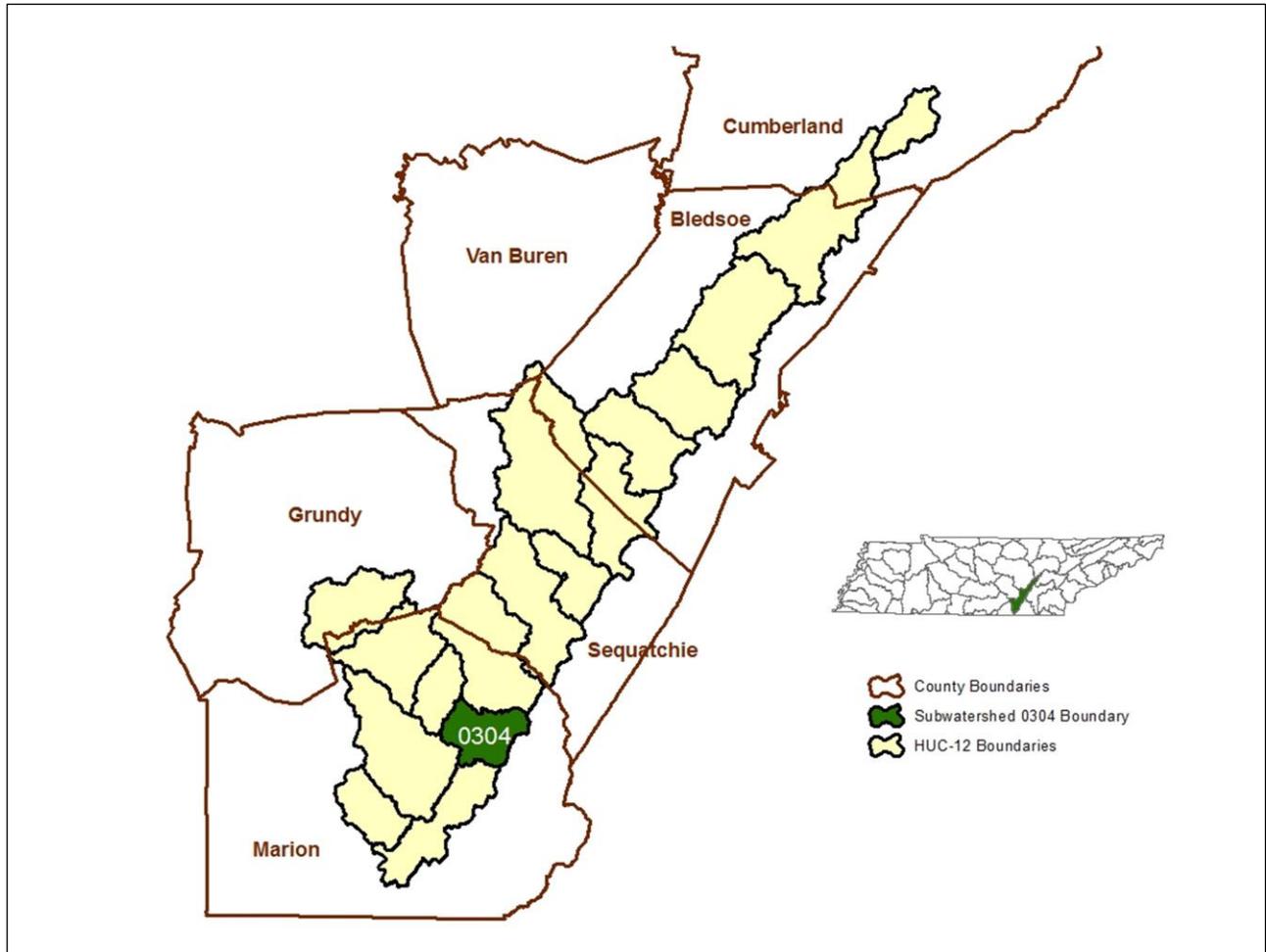


Figure 1. Location of HUC-12 Subwatershed 060200040304 in the Sequatchie River Watershed. Subwatershed 060200040304 is Sequatchie River-Hicks Creek Subwatershed. Unnamed Tributary to Shelton Creek is within the Subwatershed 060200040304 boundary.

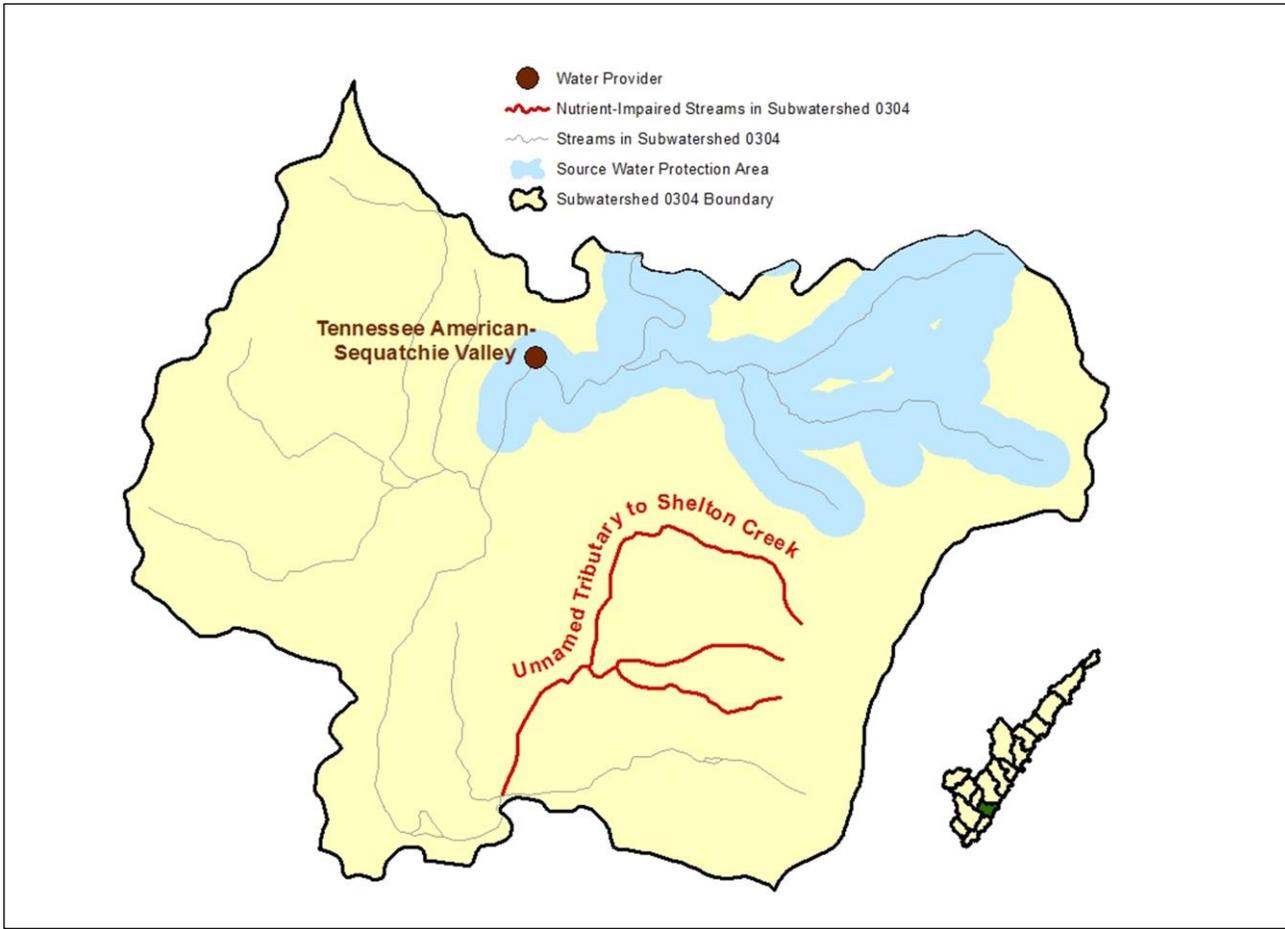


Figure 2. Illustration of Location of Nutrient-Impaired Stream and Source Water Protection Area in HUC-12 Subwatershed 060200040304.

SEGMENT NUMBER	NAME	COUNTY	MILES	CAUSES/TMDL PRIORITY)	SOURCES
TN06020004001_0910	UT to Shelton Creek	Marion	6.3	Nitrate/Nitrite (Nitrite + Nitrate as N) Low	Land Application of Wastewater Biosolids (Non-agricultural) Grazing in Riparian or Shoreline Zones

Table 2. Water Quality Description of Unnamed Tributary to Shelton Creek in Subwatershed 060200040304 from Tennessee’s List of Impaired Streams as of 04/01/2018. UT, Unnamed Tributary.

II. Action Plan that Addresses Point and Nonpoint Sources.

Tennessee is using both a point source and nonpoint source approach for reducing nutrients, if applicable.

Point Sources. There are no individual NPDES permits issued authorizing discharges in Subwatershed 060200040304.

Nonpoint Sources. In rural areas of Tennessee, excess nutrients in streams are frequently due to several agricultural practices (mostly poor pasture management and livestock access to the stream) and failing septic systems. Proper pasture management has been known to improve water quality for some time. In the USDA publication "Nutrient Management in Pastures and Haylands," authors Wood, *et al.* argue for the judicious use of nutrients in managing the nation's pastures and haylands.

The Land and Water Stewardship Section (LWSS) within the Tennessee Department of Agriculture (TDA), administers the Section 319 Nonpoint Source Program and the state-funded Agricultural Resources Conservation Fund Program to assist landowners who wish to install Best Management Practices (BMPs). In the Sequatchie River's Hicks Creek Subwatershed 060200040304, practices installed by stakeholders were all United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS)-approved practices designed to reduce sediment and nutrients.

The TDA-LWSS funded a 319/Nonpoint Source Program project in fiscal year 2011 with the Southeast Tennessee Resource Conservation and Development Council (RC&D) for \$190,000 (covering activities for 3/16/12 through 7/31/15). The proposal (Sequatchie Valley Tributaries Project) had the objective to reduce pathogen nonpoint source pollution from agriculture and septic systems in several impaired tributary streams to the Sequatchie River. While the grant was to address pathogens from pastures and failing septic systems, the same BMPs are expected to address nutrient runoff (the Unnamed Tributary to Shelton Creek is impaired for nutrients in the 2018 List of Impaired Streams).

Previous studies, assessments, and implementation efforts by TDEC, TDA, TVA, University of the South, USDA-NRCS, and Soil Conservation Districts (SCDs) formed the basis of the project. A local planning group comprised of local stakeholders, TDA 319 program staff, NRCS, and the Soil Conservation staff met in October 2010 to formulate next stages of effort in the Sequatchie Valley. It was the consensus of the group to build on previous efforts by targeting BMP treatments in selected tributaries to the Sequatchie River. This would: (1) focus efforts where treatments should result in relatively quick (3-5 years) positive changes in stream quality and (2) gauge local property owner reception to proposed BMPs.

Studies and assessments by the University of the South at Sewanee and University of Tennessee at Chattanooga have completed GIS inventories of the Sequatchie Valley (partially paid by TDEC via a 604(b) planning grant). These studies served as data sources to develop watershed plans for this project which targeted BMP placements to address potential sources within a 500-foot stream buffer of the impaired streams. Using data from the University of the South GIS inventory (2003 aerial data), a buffer analysis of house counts within 500 feet of impaired streams indicated a potential of septic systems (and failures) in the Sequatchie project area.

The activities coordinated by the RC&D, which were designed to control E. coli, are expected to reduce nutrients from poorly managed pastures and from failing septic systems.

The Sequatchie Valley Tributaries Project had three main objectives:

1. Continue agricultural BMP implementation with targeted technical and financial assistance for tributary streams
2. Develop onsite wastewater BMP implementation effort (septic tank pump-outs and/or system repair including replacement if necessary)
3. Initiate educational projects (community outreach field days, workshops, etc. that utilizes University of the South students and local high school groups to build support and participate in the project)

The following tasks were completed during the term of the award by the Sequatchie River Tributaries Project:

Task 1: Establish coordination with TDA

Task 2: Establish Local Technical Teams

Task 3: Install Agricultural BMPs

- 200 feet of guttering system with 300 feet of pipe
- 300 feet of guttering system, 660 feet of pipe, 140 feet of access road
- 725 feet of webbed exclusion fencing
- 42 acres of pasture revitalization
- 1,642 feet of exclusion fencing
- 5,658 ft of exclusion fence, 2,200 feet of pipeline, 3 watering facilities
- 1,300 ft of exclusion fence, 2 watering stations, 1,000 ft of pipeline, 1 pump
- 360 feet of exclusion fence, well, pump, reservoir
- 1,300 feet of exclusion fence, watering station, pipe, pump

Task 4: Conduct Workshops:

- Initiated GIS analysis to identify land owners in targeted watersheds
- Initiated search for septic system contractors
- Scheduled septic system installer workshops
- Held septic system installer workshops
- Scheduled homeowner pumpout workshops

Task 5: Conduct Septic System Pump Outs/Repairs

- Conducted 5 pumpouts
- Completed 18 septic system repairs

Task 6: Conduct education and outreach

- Held GIS Training Workshop for 319 project managers and Sewanee interns
- Held educational event for Sewanee students at University of the South
- Initiated internships with the University of the South with training sessions
- Completed first internship
- Held pumpout workshop
- Held tree planting in Powells Crossroads
- Established Sewanee University internship
- Completed 1 septic pumpout
- Expanded outreach areas to include Little and Browns Creeks (outreach includes talking at cattlemen's association meeting)
- 4th of July Public Outreach and Education

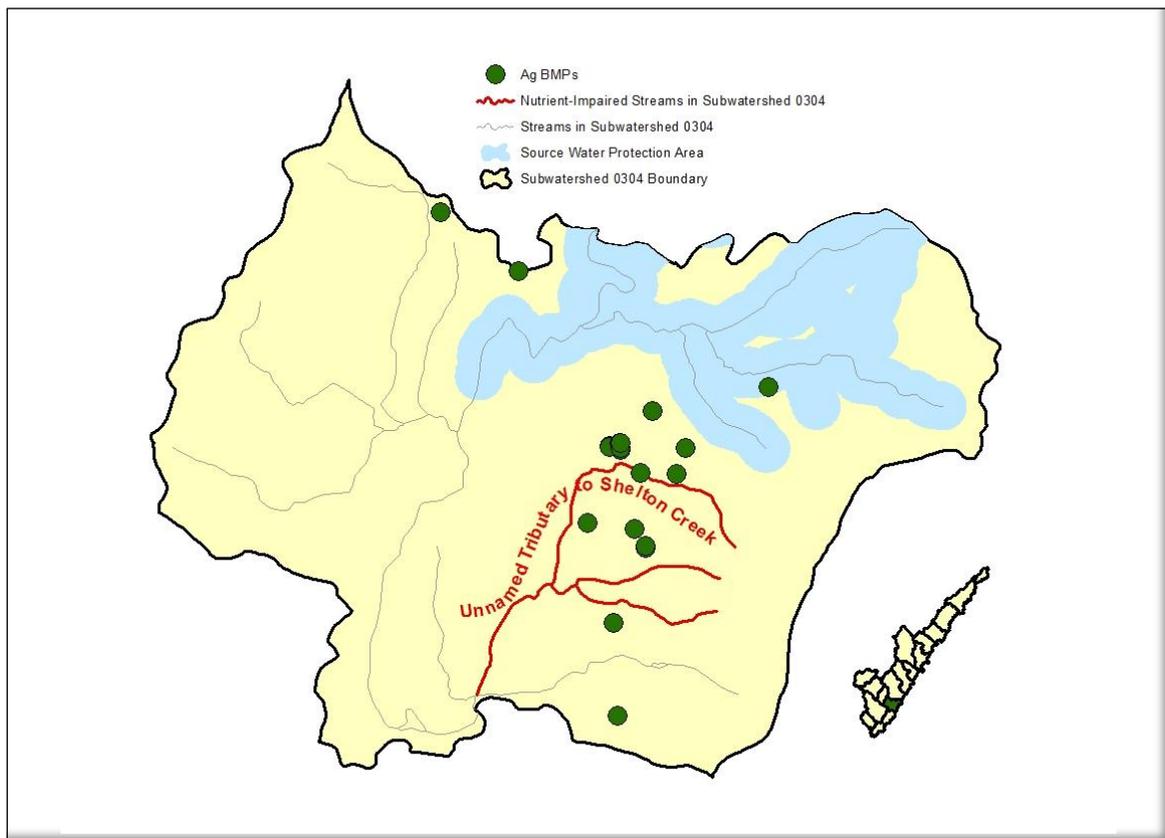


Figure 3. BMPs Installed in Sequatchie River Subwatershed 060200040304 with Tennessee Department of Agriculture Funds. There were 23 BMPs installed using 319 or state (Agricultural Resource Conservation) funds from 2007 through 2015. USDA-NRCS installed at least an additional 13,959 acres of BMPs to address nutrient impairments in this subwatershed between 2007 and 2016. BMP, Best Management Practice, USDA-NRCS, Natural Resource Conservation Service. Ag, Agriculture; BMP, Best Management Practice.

The Tennessee Department of Agriculture has run EPA's STEP-L spreadsheet tool for BMPs implemented as part of 319 and Agricultural Resource Conservation Funds in Subwatershed 060200040304.

RUNOFF REDUCTIONS DUE TO BMPs		
Nitrogen	Phosphorus	Sediment
6,701 lbs/yr	656 lbs/yr	145 tons/yr

Table 3. Nitrogen, Phosphorus, and Sediment Reductions due to BMPs Calculated Using EPA STEP-L Model. Lbs, pounds; yr, year. Additional reductions due to USDA-NRCS-implemented BMPs are not shown.

III. Nonpoint Source Funding Opportunities and Commitment of Partners.

Project funding was principally provided through a 319/Nonpoint Source Program grant to the Southeast Tennessee RC&D, who worked with these cooperating agencies who provided matches (in-kind or cash):

COOPERATING AGENCY	ROLE IN PROJECT
University of the South	Technical support (community outreach, watershed planning, GIS support, stream monitoring)
TDA	Technical and financial assistance, project oversight
TDEC/DWR	Stream monitoring data, water quality assessments, technical advice, inspection of septic systems
Grundy County SCD	Local landowner access and support
Bledsoe County SCD	Local landowner access and support
Marion County SCD	Local landowner access and support
Sequatchie County SCD	Local landowner access and support
Southeast Tennessee RC&D	Administrative and logistical lead, project support and implementation
USDA-NRCS	Technical assistance
TWRA	Streambank/habitat related projects, guidance on native vegetation

Cooperating Agencies in Sequatchie River Subwatershed 060200040304 Project. TDA, Tennessee Department of Agriculture; TDEC, Tennessee Department of Environment and Conservation; DWR, Division of Water Resources; SCD, Soil Conservation District; RC&D, Resource Conservation and Development Council; USDA, United States Department of Agriculture; NRCS, Natural Resources Conservation Service; TWRA, Tennessee Wildlife Resources Agency. At the time this grant was awarded, the Division of Water Pollution Control and Division of Groundwater Protection were cooperation agencies (both divisions are now part of the reorganized Division of Water Resources).

Southeast Tennessee RC&D budget:

ITEM	DIRECT	MATCH	TOTAL
Professional Fees/Grant Awards	\$165,000	\$125,000	\$290,000
Travel	5,000	6,000	\$11,000
Indirect Cost	20,000		\$20,000
TOTAL	\$190,000	\$131,000	\$321,000

Table 4. Budget for Sequatchie River Subwatershed 060200040304 Project. In this report, line items are omitted if no money were requested.

The cooperating agencies committed to accomplishing these tasks:

BMP NAME	BMP CODE	QUANTITY
Livestock access control	472	10 miles
Critical area planting	342	2350 acres
Fencing	382	25 miles
Nutrient management of pastures	590	11,750 acres
Pasture/hay planting	512	2820 acres
Pond (alternative watering source)	378	50,000 cubic yards
Riparian forest buffer	391	42 acres
Riparian herbaceous cover	390	42 acres
Tree-shrub establishment	612	470 acres
Watering facility	614	150 each
Septic tank pump-out	-	4,300 units
Septic tank repair	-	860 units

Table 5. Accomplishments by partners in Sequatchie River Subwatershed 06020004 Project.

The close-out report for this grant states that “If not for this grant, many farmers simply would not have the resources to accomplish these conservation practices and many residents would still have failed septic systems. We have received an overwhelming and kind response from the community that we have helped. Although the primary goal of this grant is to create a quantifiable difference in the quality of the stream, it is difficult to separate the humanitarian aspect of the work. From the many that have been helped, you have their heartfelt thanks.”

IV. Date When Water Quality Standards are Expected to be Achieved.

According to our watershed approach schedule, water quality assessment for the Sequatchie River Watershed, which includes the Hicks Creek HUC-12 subwatershed, is scheduled for fall 2022. Comments from the most recent assessment of Unnamed Tributary to Shelton Creek (2018) do not address nitrate-nitrite but note that benthic macroinvertebrate populations are still low. Nevertheless, the most recent chemical data show a marked improvement over past years (see Effectiveness Monitoring section). Habitat scores have also improved over the years. This aligns with the comments in the Southeast Tennessee RC&D Council application that states that partners reached a consensus that it would take three to five years [from 2015] to see an improvement in water quality.

The Sequatchie River-Hicks Creek project has many BMPs that were recently installed. If lowered nitrite-nitrate concentrations and improved habitat lead to recovery of benthic macroinvertebrates, then Unnamed Tributary to Shelton Creek may be assessed as meeting water quality criteria and come off the List of Impaired Waters as early as 2022 or 2027.

V. Effectiveness Monitoring.

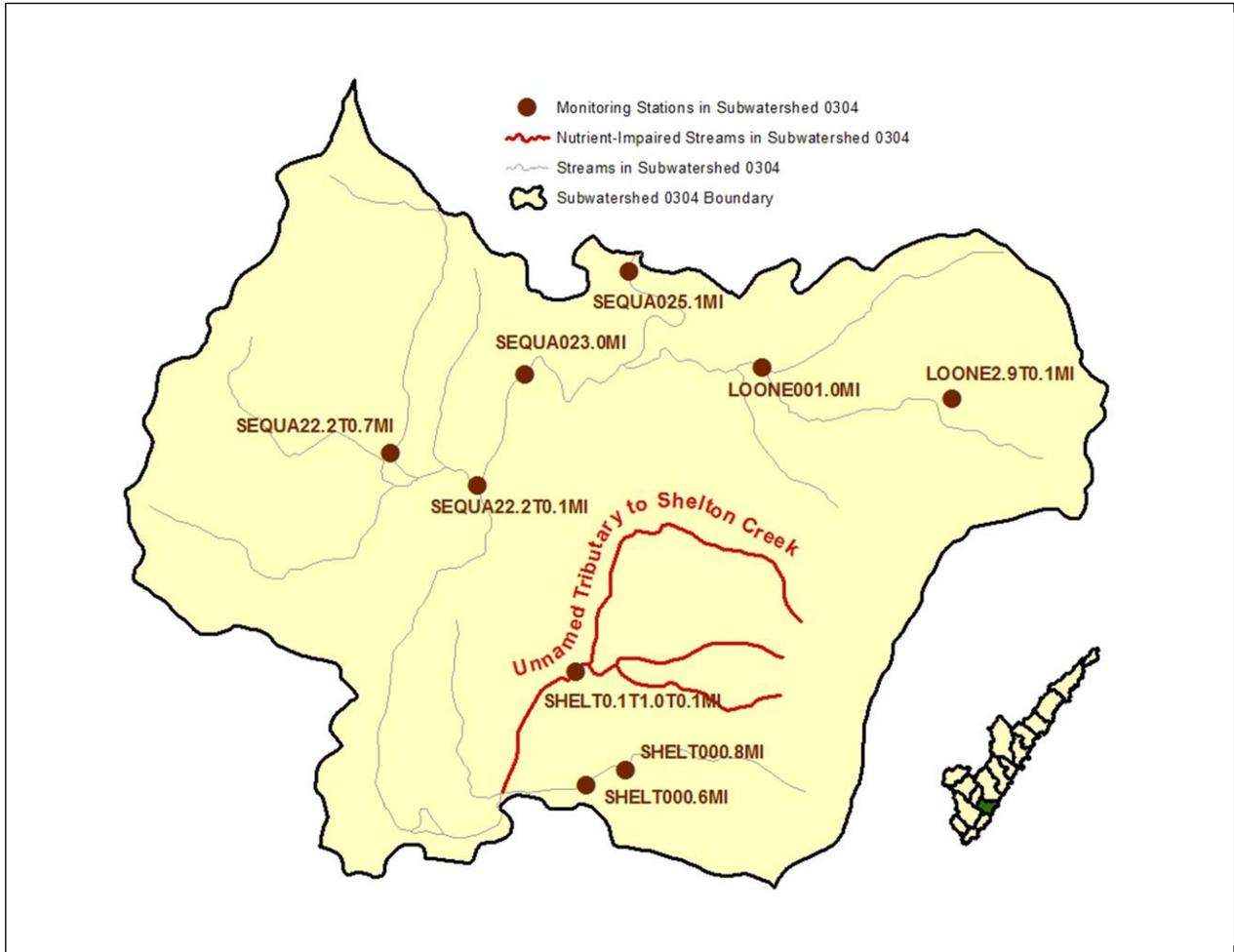


Figure 4. Illustration of Monitoring Sites in Sequatchie River Subwatershed 060200040304.

Of the nine monitoring sites in the Sequatchie River-Hicks Creek Subwatershed, one is on the nutrient-impaired segment:

MONITORING SITE	LOCATION	COUNTY
SHELTO.1T1.0T0.1MI	Unnamed Tributary to Shelton Creek @ RM 0.1	Marion

Table 6. Monitoring Site on Nutrient-Impaired Waters in HUC-12 Subwatershed 060200040304. RM, River Mile.

Eight sites are located on streams in Subwatershed 060200040304 that are not impaired by nutrients:

MONITORING SITE	LOCATION	COUNTY
SEQUA025.1MI	Sequatchie River @ RM 25.1	Marion
SEQUA023.0	Sequatchie River @ RM 23.0	Marion
SEQUA22.2T0.7MI	UT @ RM 0.7 to Sequatchie River @ RM 22.2	Marion
SEQUA22.2T0.1MI	UT @ RM 0.1 to Sequatchie River @ RM 22.2	Marion
LOONE001.0MI	Looneys Creek @ RM 1.0	Marion
LOONE2.9T0.1MI	UT @ RM 0.1 to Looneys Creek @ RM 2.9	Marion
SHELTO00.8MI	Shelton Creek @ RM 0.8	Marion
SHELTO00.6MI	Shelton Creek @ RM 0.6	Marion

Table 7. Additional Monitoring Sites in HUC-12 Subwatershed 060200040304. RM, River Mile; UT, Unnamed tributary.

Only monitoring sites that are on nutrient-impaired waters will be discussed in remainder of this report.

Monitoring data from nutrient-impaired waters in Subwatershed 060200040304.

Nitrogen

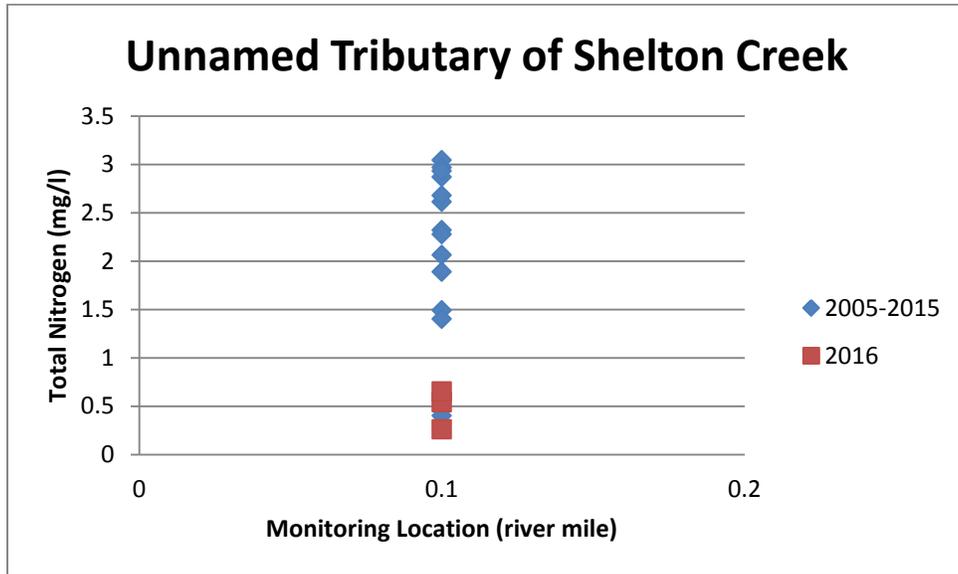


Figure 5. Total Nitrogen Data from SHELTO.1T1.0T0.1MI Monitoring Site 2005-2016.

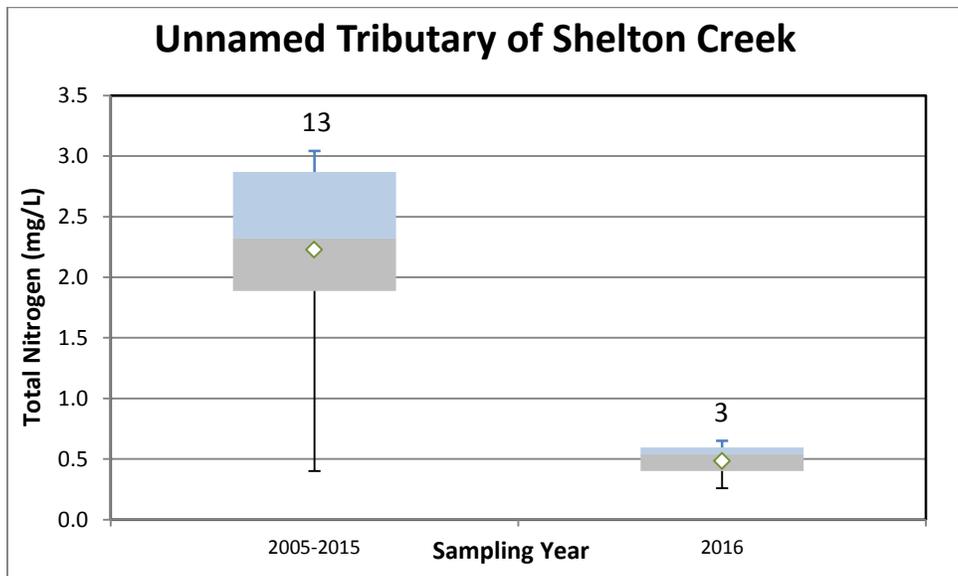


Figure 6. Comparison of Total Nitrogen at SHELTO.1T1.0T0.1MI 2005-2015 and 2016 Monitoring Seasons. Numbers indicate number of samples in the analysis (n).

Figures 5 and 6 illustrate that there were reductions in instream nitrogen concentrations in Unnamed Tributary to Shelton Creek monitoring station when comparing 2005-2015 and 2016 sampling seasons.

Figures 7 and 8 are shown for completeness (the stream is not impaired due to phosphorus).

Phosphorus

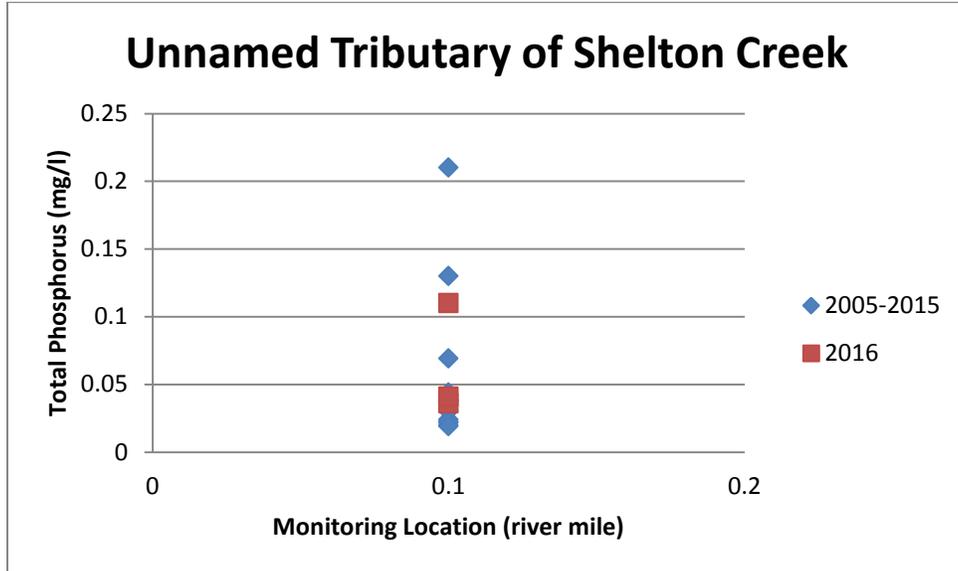


Figure 7. Total Phosphorus Data from SHELTO.1T1.0T0.1MI Monitoring Site 2005-2016.

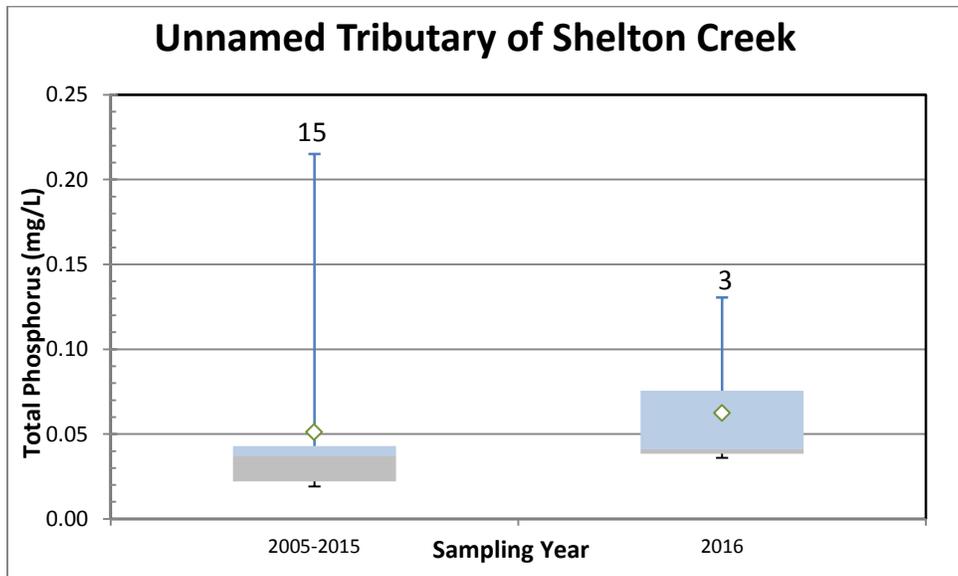


Figure 8. Comparison of Total Phosphorus at SHELTO.1T1.0T0.1MI 2005-2015 and 2016 Monitoring Seasons. Numbers indicate number of samples in the analysis (n).

Figures 7 and 8 illustrate that there were no reductions in instream phosphorus concentrations in Unnamed Tributary to Shelton Creek monitoring station when comparing 2005-2015 and 2016 sampling seasons.

Tennessee’s nutrient water quality standards are narrative and have both a chemical (nutrients) and biological (e.g., benthic macroinvertebrates) component. Benthic macroinvertebrate data were collected at one site on nutrient-impaired waters (Unnamed Tributary to Shelton Creek). Monitoring on streams not impaired for nutrients are not shown.

SITE	DATE	TMI	TOTAL TAXA	%EPT-CHEUM	% NUTRIENT TOLERANT	HABITAT SCORE
SHELTO.1T1.0T0.1MI	01/14/2011	26	26	1.5	30.4	40
SHELTO.1T1.0T0.1MI	05/19/2016	22	30	1.0	32.5	108

Table 8. Benthic Macroinvertebrate Data from Monitoring Site on Unnamed Tributary to Shelton Creek. TMI, Tennessee Macroinvertebrate Index; EPT, Ephemeroptera, Plecoptera, Trichoptera; Cheum, Cheumatopsyche.

Biological data summary for Unnamed Tributary to Shelton Creek Monitoring Site:

- TMI data from SHELTO.1T1.0T0.1MI site shows a failing score in 2011 and 2016 (passing score is 32)
- %Nutrient tolerant data at SHELTO.1T1.0T0.1MI show no change between 2011 and 2016 (for this ecoregion, size, and monitoring season, a score of less than 28% approaches reference conditions)
- Habitat scores at SHELTO.1T1.0T0.1MI show improvement between 2011 and 2016, making it possible that macroinvertebrates will recover in the next assessment (for this ecoregion, size, and monitoring season, a passing score is 135)

More information about Tennessee’s TMI score is in TDEC’s Benthic macroinvertebrate SOP at:

<https://www.tn.gov/content/dam/tn/environment/water/documents/DWR-PAS-P-01-Quality System SOP for Macroinvertebrate Stream Surveys-081117.pdf>.

It’s important to note that these data were collected as the BMPs were being installed, or shortly after some were implemented, indicating that more time post-BMP implementation is needed before additional improvement is documented. The next round of biological and chemical monitoring is scheduled for 2020.

VI. Current and Future Activities.

The most recent 319 grant to the Southeast Tennessee RC&D Council for work in subwatershed 060200040304 has expired. The Council is still interested in recruiting additional landowners to participate in installing BMPs designed to improve water quality. TDA 319 program Request For Proposals for the next round of grants are due annually on December 1.

USDA-NRCS continues to fund projects through the Environmental Quality Incentives Program (EQIP), and other qualifying Farm Bill Conservation Title programs.

The Tennessee Department of Agriculture also continues to fund on-farm best management practices statewide in an effort to reduce the addition of pollutants such as sediment, nutrients, and pathogens from the agricultural landscape to surface waters. These funds are administered through each county's Soil Conservation District (SCD) and all agricultural land is eligible to receive funding, at the discretion of the local SCD Board.

VIII. Further Information.

For further information about TMDLs and 5-alt documents in Tennessee, visit the TDEC/DWR web site:

<https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/tennessee-s-total-maximum-daily-load--tmdl--program.html>

Technical questions regarding this 5-alt report should be directed to:

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LIST of INITIALS and ACRONYMS USED

303(d). Section 303(d) of the Clean Water Act that addresses impaired waters.

ARCF. Agricultural Resources Conservation Fund.

BMP. Best Management Practice.

Cheum. Cheumatopsyche insect Genus.

CWA. Clean Water Act.

DMR. Discharge Monitoring Report.

DWR. Division of Water Resources.

EPA. Environmental Protection Agency.

EPT. Ephemeroptera, Plecoptera, Trichoptera insect Orders.

EQIP. Environmental Quality Incentives Program.

FY. Fiscal Year.

HUC. Hydrologic Unit Code.

HUC-12. Twelve-Digit Hydrologic Unit Code.

MGD. Million Gallons per Day.

NPDES. National Pollutant Discharge Elimination System.

USDA-NRCS. Natural Resources Conservation Service.

RC&D. Resource Conservation and Development.

RFP. Request for Proposals.

RM. River Mile.

SCD. Soil Conservation District.

SPARROW. Spatially Referenced Regression on Watershed attributes.

STP. Sewage Treatment Plant.

TDA. Tennessee Department of Agriculture.

TDEC. Tennessee Department of Environment and Conservation.

TMDL. Total Maximum Daily Load.

TMI. Tennessee Macroinvertebrate Index.

TVA. Tennessee Valley Authority.

USDA. United States Department of Agriculture.

UT-Ext. University of Tennessee Extension.

WWTP. Wastewater Treatment Plant.

REFERENCES CITED

Information Concerning 2016 Clean Water Act Sections 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions (EPA)

https://www.epa.gov/sites/production/files/2015-10/documents/2016-ir-memo-and-cover-memo-8_13_2015.pdf

A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program” (December 2013)

https://www.epa.gov/sites/production/files/2015-07/documents/vision_303d_program_dec_2013.pdf

Tennessee Prioritization of TMDLs document under the New Vision

https://www.tn.gov/content/dam/tn/environment/water/tmdl-program/wr-ws_tmdl-priority-framework-101415.pdf

TDEC Watershed Approach

<https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/watershed-management-approach.html>

C. Jerry Nelson (editor). Conservation Outcomes from Pastureland and Hayland Practices: Assessment, Recommendations, and Knowledge Gaps. Chapter 5: Nutrient Management on Pastures and Haylands (Wood, C.W., Moore, P.A., Joern, Brad C., Jackson, R.D., and Cabrera, M.L.). 2012.

https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1080496.pdf